

## What is the Biotechnology Program?

Biotechnology is broadly defined as using living organisms, or products of living organisms, to improve life, to make a product, or to solve a problem. This field is one of the most rapidly changing areas of science. The 21st century has been called the “century of biotechnology.”

Individuals working in biotechnology are directly or indirectly involved in the process of discovering, developing, manufacturing, or regulating the final quality of new products. Typical job titles include biological sciences technician, laboratory technician, research technician, or research assistant.

Most entry-level technicians in a research environment are responsible for preparing materials and maintaining equipment used by scientists. With experience and more education, these technicians evolve into research assistants and carry out experiments under the supervision of established scientists. In the manufacturing branch of biotechnology, entry-level positions are material handlers, manufacturing assistants, and engineering technicians. Additional information is available online at [www.hagerstowncc.edu/biotech](http://www.hagerstowncc.edu/biotech).

## What type of students excel in this program?

Students who do well in this program typically have good attention to detail, excellent written communication skills, good motor skills, and

the ability to focus for long periods of time.

## What is the employment outlook for this career field?

According to local biotechnology employers, the projected growth of the biotechnology workforce in western Maryland is 47 percent over the next several years. These professionals reaffirmed the need for trained biotechnology technicians, and predicted that the need will continue to expand, especially in the tri-state area, as the biotechnology expansion saturates Montgomery and Frederick counties and reaches Washington County.

## What types of jobs do biological technicians perform?

There are many different types of biotechnology, which have resulted in a huge industry that employs approximately 200,000 people nationwide. There are a wide range of employment choices such as laboratory technicians, computer programmers, laboratory directors, research associates, principle or senior scientists, bioinformaticists, manufacturing and production technicians, and associates and engineers. The work they perform can relate to medical and pharmaceutical research, microbiology, forensics, agriculture, bioremediation and many other types of research and product development. The biotechnology industry has been in existence for about 30 years.

## What do biological technicians earn?

Earnings vary depending on experience, education, geographical location, and area of specialty. According to nationwide data collected for 2016, the average annual salary for biological technicians in nonsupervisory positions was \$42,520 (source: [www.bls.gov/ooh](http://www.bls.gov/ooh)). The Bureau of Labor Statistics also reports that the lowest 10 percent of biological technicians earned \$27,660 and the top 10 percent earned \$69,590 in 2016.

## What are the program options?

Students can earn a certificate (22 credits) or the two-year associate of applied science degree in biotechnology (60 credits). With the completion of either of these programs, students are usually prepared to begin work as a technician or transfer into a bachelor’s program. Some students may prefer to earn the two-year associate degree in biology or

chemistry and transfer to an upper-division program using their biotechnology skills to work part-time in a research, industrial, or undergraduate laboratory while completing the last two years of their baccalaureate program.

## Why choose HCC?

- All biotechnology courses are offered in fully-equipped, state-of-the-art laboratories in the STEM Building
- Biotechnology classes are taught by faculty with research credentials in the biotech industry
- HCC has one of the largest biotechnology programs in the nation and has been supported by \$1.5 million in grants
- Students in the Biotechnology Program can complete internships, which helps them get on-site training and prepares them for employment in the biotech industry. Internships are available in the following areas:
  - Biotechnology firms in Montgomery and Frederick counties
  - One of the start-up companies in HCC’s Technical Innovation Center
  - In the public sector including Fort Detrick in Frederick or the U.S. Department of Agriculture, based in W.Va.
  - InnovaBio-MD labs

For more information about HCC graduation rates, the median debt of students who completed the program, and other important information, visit [www.hagerstowncc.edu/biotech](http://www.hagerstowncc.edu/biotech).

## What is InnovaBio-MD?

HCC’s Biotechnology Program now offers an on-campus internship program called InnovaBio-MD. InnovaBio-MD is a unique career and technical education program aimed at training high school and college students for entry-level positions in the biotechnology industry. It prepares students for immediate hands-on work in critical, high-impact industries in a way no other training program does. InnovaBio-MD contracts projects from regional biotechnology agencies and interns conduct the work. The research projects are performed on-campus at HCC’s Advanced Technology Center and are supervised by

the InnovaBio-MD scientific staff. The challenging research completed by the interns creates a valuable talent pool for Maryland biotechnology companies. InnovaBio-MD was modeled after the Salt Lake Community College InnovaBio program.

A.A.S. Degree

## Biotechnology

The Biotechnology Program is designed to prepare students for entry-level technician positions in biomedical, research, and industrial laboratory areas. Depending on a person's academic background and work experience, the biotechnology technician-in-training may complete the one year biotechnology certificate (22 credits) or the two-year associate of applied science (A.A.S.) degree in biotechnology (60 credits).

The biotechnology courses are offered in fully-equipped state-of-the-art laboratories and graduates have the necessary skills, knowledge, and attributes to work immediately upon graduation and to advance with on-the-job experience and continued academic training. Some areas of opportunity for graduates include: biomedical technology, biomanufacturing, pharmaceuticals, plant research, and forensics.

### General Education Requirements 23-24 credits Arts and Humanities

Select from approved General Education course list .. 3

### Behavioral/Social Sciences

Select from approved General Education course list .. 3

### Biological/Physical Science

BIO 113 Principles of Biology I ..... 4

CHM 101 Introductory College Chemistry..... 4

OR

CHM 103 General Chemistry I ..... (4)

### Diversity

Select from approved General Education course list .. 3

### English

ENG 101 English Composition..... 3

\*Minimum grade of a "C" or better is required.

### Mathematics

College Algebra or another MAT course from the approved general education list..... 3-4

### Program Requirements 22 credits

BIO 201 Cell Biology..... 4

BIO 205 Microbiology ..... 4

BTC 101 Introduction to Biotechnology..... 3

BTC 201 Discovery Research ..... 4

BTC 202 Biomanufacturing..... 4

MAT 109 Introduction to Statistics..... 3

### Restricted Electives 14-15 Credits

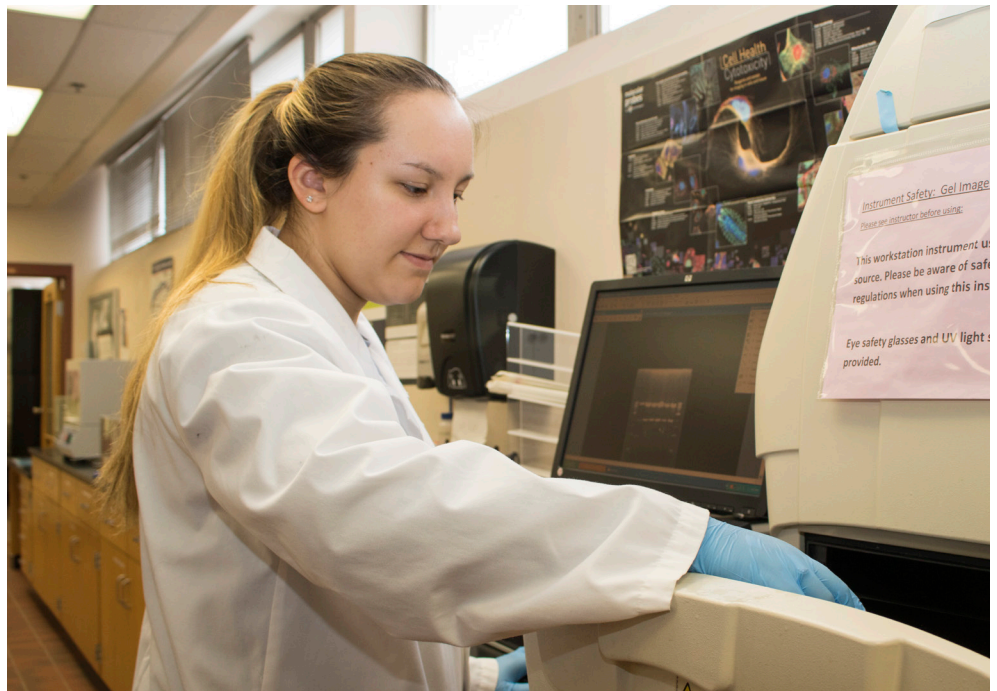
Select restricted elective credits from the list below.

**\*BTC 269 - Biotechnology Internship I is strongly recommended for all qualified students.**

BIO 203 Human Anatomy and Physiology I .....(4)

BIO 204 Human Anatomy and Physiology II .....(4)

BIO 111 Contemporary Issues in Biology .....(3)



BIO 114	Principles of Biology II.....(4)
BTC 102	Introduction to Applied Biotechnology Research .....(3)
BTC 103	Forensic Science .....(4)
BTC 111	Special Topics in Biotechnology .....(3)
BTC 269	Biotechnology Internship I.....(3)
BTC 270	Biotechnology Internship II.....(3)
CHM 103	General Chemistry I .....(4)
CHM 104	General Chemistry II .....(4)
CHM 203	Organic Chemistry I .....(4)
CHM 204	Organic Chemistry II .....(4)
EGR	Select any Engineering Science course.....(3-4)
ENV 201	Fundamentals of Environmental Science I.....(4)
ENV 202	Fundamentals of Environmental Science II.....(4)
IST 166	Computer Forensics I—Principles and Practices .....(3)
IST 266	Computer Forensics II—Investigations Practices.....(3)
PHL 103	Ethics .....(3)
PHY 201	General Physics I.....(4)
PHY 202	General Physics II.....(4)

### Degree Requirement.....60

### Certificate

## Biotechnology

The biotechnology certificate is designed for the technician-in training with the academic background and work experience to complete a program in one year, work immediately, and advance with on-the-job experience. The credits earned in the certificate can be applied to the A.A.S. degree or to many B.S. degrees at upper division institutions. Some areas of opportunity for technicians with this certificate include: biomedical technology, biomanufacturing, pharmaceuticals, plant research, and forensics.

<b>Program Requirements</b>	<b>22 credits</b>
BIO 113	Principles of Biology I..... 4
BIO 201	Cell Biology and Genetics ..... 4
	<b>OR</b>
BIO 205	Microbiology.....(4)
BTC 101	Introduction to Biotechnology..... 3
BTC 201	Discovery Research ..... 4
	<b>OR</b>
BTC 202	Biomanufacturing.....(4)
CHM 101	Introductory College Chemistry ..... 4
	<b>OR</b>
CHM 103	General Chemistry I .....(4)
MAT 101	College Algebra or another MAT course from the approved general education list..... 3-4

### Certificate Requirement .....22

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